

Factors Influencing Integration of ICT in Higher Education in Vietnam

Jef Peeraer*

Flemish Association for Development Cooperation and Technical Assistance Vietnam
Thao Vien guesthouse A3 rm 307, 1B Bac Son - Ngoc Ha, Hanoi, Vietnam
jef.peeraer@gmail.com

Peter Van Petegem

University of Antwerp, Institution of Education and Information Sciences
Venusstraat 35, 2000 Antwerp, Belgium
peter.vanpetegem@ua.ac.be

Abstract: This study investigates the factors influencing integration of ICT in teacher education in Vietnam, an emerging developing country, at the beginning of integration of ICT. Exploratory multiple regression analysis addresses the importance of different factors at the teacher level and the importance of the teacher education institute for the integration of ICT in teaching practice. The use of ICT applications for teaching practice is limited, mostly replacing traditional teaching practice. The factors explaining the integration of ICT in teaching practice are ICT skills and computer confidence. Significant differences exist between different teacher education institutions. Suggestions are made as to what approach to take to effectively integrate ICT in teacher education in Vietnam.

Introduction

Integrating ICT in teaching and learning is high on the educational reform agenda. Often ICT is seen as indispensable tool to fully participate in the knowledge society. ICTs need to be seen as “an essential aspect of teaching’s cultural toolkit in the twenty-first century, affording new and transformative models of development that extend the nature and reach of teacher learning wherever it takes place” (Leach, 2005). For developing countries like Vietnam, ICT can moreover be seen as a way to merge into a globalizing world. In the school year 2008-2009 the Vietnamese Ministry of Education and Training (MOET) launched the year of ICT in education. ICT is conceptualized as a tool that can effectively support the innovation of teaching, learning and education management, and that contributes to improve efficiency and quality of education (MOET, 2008). Educators in Vietnam are encouraged to reasonably implement ICT applications in new and innovative methods of teaching and learning at each grade (MOET, 2008).

A study took place, addressing factors influencing or constraining the uptake of ICT of teacher educators of five teacher education institutes in five provinces in the middle and the North of Vietnam. This research paper reports on the baseline situation of the teacher education institutions in the beginning of the school year 2008-2009, at the start of ‘The Year of ICT’.

Conceptual Framework An Educational Reform Agenda

Although countries are at the beginning of using new technology, its future use in education cannot be underestimated (Carnoy & Rhoten, 2002). It is assumed that ICT brings revolutionary change in teaching methodologies. The innovation lies not per se in the introduction and use of ICT, but in its role as a contributor towards a student-centered form of teaching and learning (Scrimshaw, 2004). John and Sutherland (2005) warn to be cautious though when speaking of the affordances of new technologies and when assuming that a given medium or technology will automatically afford particular learning outcomes. In reality, learning is always distributed in some

* Corresponding author, tel: +84 (0) 909 824 889, fax: +84 (4) 734 72 90

form between the technology, the learner and the context and there is nothing inherent in technology that automatically guarantees learning. More and more critical voices are raised in the West and recently two observations temper expectations: first there has been a disappointingly slow uptake of ICT in education even though high investments have taken place in improving access to technologies and improving skills of teachers and learners; secondly there doesn't seem to have taken place an educational revolution in teaching and learning (Selwyn, 2007). So far, computers have not transformed teaching practices (Becker, 2000). Researchers as Kirkup and Kirkwood (2005) indicate an abundance of computers and technological infrastructure in higher education institutions. In campus-based contexts, teaching staff learn to use those technologies which they can incorporate into their teaching activity that offer affordances for what they already do most easily, rather than those which radically change teaching and learning practices (Kirkup & Kirkwood, 2005).

A Model of Influencing Factors for the Use of ICT for Teaching Practice

Influencing or constraining factors to the integration of ICT in teaching practice can be categorized in different ways. In a framework addressing challenges to classroom technology use, Groff & Mouza (2008) distinguish several critical factors going from legislative, district/school level factors over factors associated with the students and the teachers to factors inherent to the technology itself and factors associated with the technology-enhanced project. Mumtaz (2000) distinguishes three interlocking factors: institution, resources and teacher. Ten Brummelhuis (in Drent & Meelissen, 2008) categorizes influencing factors in factors which can be manipulated and factors which are not manipulative. At the school level, important contextual factors are socio-cultural setting of a school and structural characteristics like government ICT policy, ICT infrastructure and school type. At teacher level, two types of barriers are common; external or first-order barriers, such as limited resources or lack of technical support, and internal or second-order barriers, which include teachers' attitudes to ICT (Snoeyink and Ertmer in Jones, 2004).

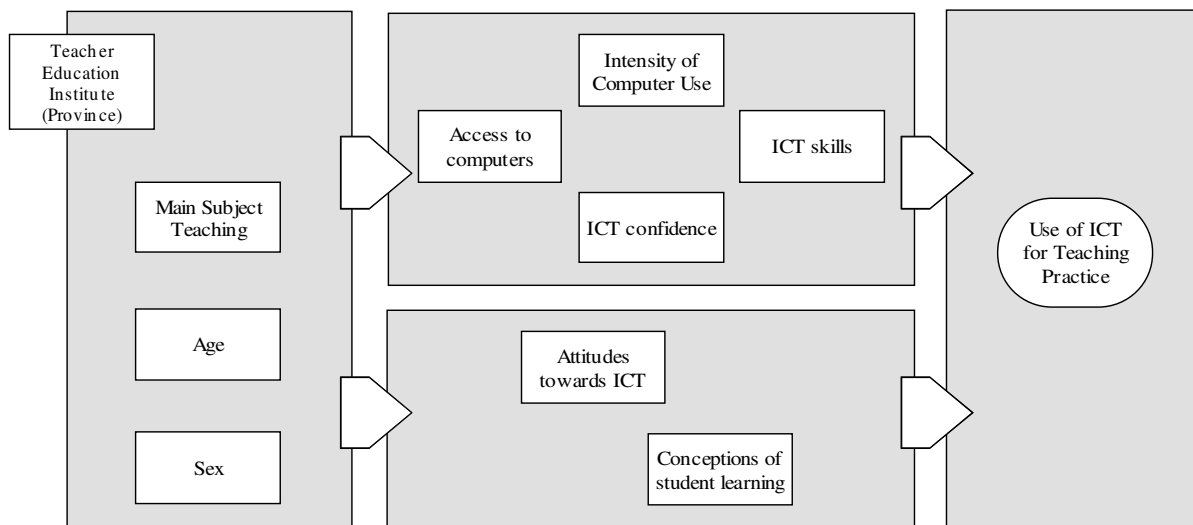


Figure 1: Model of Influencing Factors for the Use of ICT for Teaching Practice

Figure 1 describes our research model, based on literature and experience in integration of ICT in education in Vietnam. Use of ICT in teaching practice is the dependent variable. Non-manipulative factors are gender, age and subject teaching. Influencing first-order manipulative factors are access to ICT, intensity of use, confidence and skills. Of a different, internal order, are perceived values of ICT and conceptions of student learning. Province will give an indication of the additional influence of contextual factors at the level of the teacher education institution. In what follows we draw the theoretical background, reflecting on the barriers of access, confidence and skills, on digital divides and on the role of attitudes towards ICT and educational beliefs for the integration of ICT in teaching practice.

Access, Confidence and Skills

Mumtaz (2000) points out that a lack of computers and software can seriously limit what teachers can do in the classroom with regards to integration of ICT. Access to ICT is a first and necessary step in the integration process even though mere access will not automatically lead to use of ICT for teaching and learning. According to Campbell (Alampay, 2006) the digital divide refers to “situations in which there is a marked gap in access to or use of ICT devices”. Another crucial barrier to the integration of ICT is ICT competence or skills and ICT confidence. A very significant determinant of teachers’ levels of engagement in ICT is their level of confidence in using the technologies. Teachers who have little or no confidence in using computers in their work will try to avoid them altogether (Dawes, 2000; Lerner and Timberlake, 1995; Russell and Bradley, 1997 in Jones, 2004). Jones’ review demonstrates that there are close relationships between barriers to the integration of ICT. Lack of personal access, technical problems or lack of teacher competence can lead to lack of teacher confidence, but in turn, a lack of confidence could itself magnify the effects of these three barriers (Jones, 2004).

Digital Divides

Individual differences between educators influence access to ICT, use, confidence and skills (Jones, 2004). Often non-manipulative factors at the level of the teacher like age and gender are described (Cooper, 2006; Meelissen & Drent, 2008; Prensky, 2001; Todman & Day, 2006). Computer anxiety is often highlighted as the fundamental problem behind the digital gender divide (Cooper, 2006; Todman, 2006). However, there are contradictions in research about the influence of gender on the use of ICT and even the very notion that there is a gender problem is problematised (Abbiss, 2008). Also age can influence the uptake of ICT for teaching (Jones, 2004). Prensky (2001) distinguishes between ICT natives, who are born in a digital world, and digital immigrants who have to learn the digital language and for whom ICT will always be a second language. Apart from gender and age, the teachers’ subject domain may influence the use of ICT. John (2005) argues that school subject cultures are built on deep traditions and that these need to be addressed if ICT is to become more embedded in the curriculum of schools. The way ICT is used in lessons is influenced by the teachers’ knowledge about their subject and how ICT is related to it (Cox et al., 2003).

Educational Beliefs and Attitudes Towards ICT

At the core of *effective* integration of ICT in teaching and learning, lie capacities which go beyond mere access and ICT literacy. There is little point in providing large quantities of equipment if teachers do not have the attitudes necessary to change their classroom practices (Ertmer in Jones, 2004). In the West, many researchers move from investigating environmental barriers of access to individual teacher characteristics like beliefs and attitudes (Hermans, Tondeur, van Braak, & Valcke, 2008; Mueller, Wood, Willoughby, Ross, & Specht, 2008). One key area of teachers’ attitudes towards ICT is their understanding of how it will benefit their work and their students’ learning (Jones, 2004). Cox (2008) expresses the need to measure, among other factors, the teachers’ beliefs and understanding of the role of IT within the subject being taught. Kirkup & Kirkwood (2005) distinguish innovators who are enthusiastic for the technology as valuable itself, and later adopters who are less interested in the technology and need evidence that it will improve their lives or work. Hermans et al. (2008) shed light on the mediating role of teachers’ educational beliefs in the resistance and receptiveness to integrate computers in classroom practice. Mumtaz (2000) concludes in a meta-analysis that teachers’ theories about teaching are central in influencing teachers to use ICT in their teaching. Teachers’ educational beliefs can be barriers to ICT integration (Ertmer in Hermans et al., 2008). Becker (in Hermans et al., 2008) suggests on the other hand that highly active computer users seem to adopt a constructivist position. Findings have been inconsistent though (Chen, 2008; Mueller et al., 2008). Positive attitudes towards ICT or constructivist perspectives on learning will not automatically lead to the uptake of ICT or innovative teaching practice. Judson (2006) suggests that there may be little correlation between stated beliefs and actual practice.

Research Aims

In the first place we want to describe to what extent ICT is integrated in teacher education in an emerging developing country, by assessing to what extent ICT is used in teaching practice. Apart from that we want to estimate the importance of external and internal manipulative factors for the integration of ICT in teaching practice, over the influence of non-manipulative factors of age and gender or main subject teaching.

Methodology

Data Collection and Participants

Data collection took place at the beginning of the school year 2008-2009 using a questionnaire presented to a total of 863 teacher educators of 5 teacher education institutes in 5 provinces in the North and the middle of Vietnam. The 5 institutes participate in a development cooperation program contributing to the education change process towards Active Teaching and Learning through integration of ICT. The questionnaires were developed based on literature research. They were translated into Vietnamese and back translated to English in order to check for mistakes and misunderstandings due to cultural adaptations. Adaptations were discussed with Vietnamese ICT experts. All staff members of the 5 teacher education institutions were invited to fill out the questionnaire. In total 783 questionnaires were filled out during plenary sessions in the 5 teacher education institutes, resulting in a response rate of 91 %.

Statistical Analysis Approach

Descriptive analysis will draw a picture of the situation of teacher education institutes in Vietnam concerning teacher educators' use of ICT for teaching practice.

Exploratory multiple regression analysis will give an idea of the influence of the non-manipulative and manipulative external and internal factors at the teacher level on the integration of ICT in teaching practice. A hierarchy of sets of independent variables is formed and tests are done on the significance of increments to R^2 by means of the F ratio. The hierarchy of sets is an important part of the investigator's hypothesis statement (Cohen, 1968). The research objective of our study is to explore the importance of manipulative factors, *over* the influence of non-manipulative factors. Therefore in the hierarchy of sets is started from non-manipulative variables on the teacher level (set 1). These variables are expected to be relevant to the dependent variable, but should be controlled for when measuring the contribution of manipulative teacher level factors. In the first place we want to assess the importance of external manipulative factors (set 2) after which we want to assess the net influence of the internal manipulative factors (set 3). Apart from the factors on the teacher level, we finally want to reflect on the importance of factors on the level of the institute (set 4).

Results

Used Scales and Reliability

A set of instruments were developed, based on existing scales, to measure the described manipulative factors and dependent variable. Reliability of the instruments was examined using Cronbach's alpha when applicable. Most instruments show satisfactory internal consistency, except for the scale on conceptions of 'student learning as intake of knowledge'. All reliable scales were used for the multiple regression analysis.

	N	α
Computer skills	19	.951
<i>Basic computer skills</i>	7	.859
<i>Internet skills</i>	7	.909
<i>Maintenance and security skills</i>	5	.842
Computer confidence	7	.801
Cognitive attitudes towards ICT	15	.724
Conceptions of Learning: Learning as intake of knowledge	9	.523
Conceptions of Learning: Learning as construction of knowledge	8	.710
Use of ICT for teaching practice	7	.869

Table 1: Reliability Coefficients Scales***Use of ICT Applications for Teaching Practice***

Most teacher educators don't use many ICT applications intensively (see table 2). 57.6 % never or rarely uses subject specific software for integration into lesson practice, 65.3 % never or rarely uses electronic communication tools like e-mail for communication with students, and 86.0 % never or rarely uses classroom management software. The picture is different for other applications like word processing software and presentation software where respectively 73.7 % and 55.0 % of teacher educators using these applications on a more regular basis (sometimes or regularly). 57.4 % sometimes or regularly accesses information through a CD-ROM or DVD and 73.6 % sometimes or regularly uses the internet as source of information.

	M	SD	Never (%)	Rarely (%)	Sometimes (%)	Regularly (%)
Production of documents	1.95	.909	8.9	17.4	43.9	29.8
Presentation	1.48	1.030	23.7	21.3	38.2	16.8
Integration into specific subjects	1.19	1.037	34.8	22.8	31.2	11.2
Access offline information	1.55	.975	18.8	23.8	41.1	16.3
Electronic communication	1.01	1.059	44.3	21.0	23.6	11.0
Access online information	1.88	.971	13.7	12.7	45.5	28.1
Classroom management	.47	.850	72.1	13.9	9.2	4.8

Table 2: Descriptive Statistics of the 'Use of ICT for Teaching Practice Scale'

Correlation analysis shows strong and significant correlations (with $p < 0.05$) between the use of different ICT applications for teaching practice.

Influence of Non-Manipulative and External and Internal Manipulative Factors

Hierarchical multiple regression analysis results in 4 models which each significantly explain a proportion of variance in the use of ICT applications for teaching practice. Non-manipulative factors at the teacher level alone explain 16.1 % of the variance. Women tend to a more limited use of ICT for teaching practice than men and age has a negative influence on intensity and diversity. The influence of gender, age and subject teaching loses significance though after entering external manipulative factors of access to ICT, intensity of use, ICT skills and confidence. It is remarkable that use of the computer for working purposes positively contributes to the use of applications for teaching practice ($\beta = 0.173$), but that ICT use in general has significant negative influence on the use of ICT for teaching practice ($\beta = -0.129$). Access to a personal computer in the institute negatively influences the uptake of ICT for teaching practice. ICT skills is a strong influencing factor ($\beta = 0.499$) and together with computer confidence ($\beta = 0.164$), these factors remain significant after adding other variables to the model.

Internal factors like attitude towards computers and conceptions of student learning as construction of knowledge do not significantly influence the use of ICT applications for teaching practice. Model 3 does not significantly differ from model 2 in explained variance. Finally the dummy variables representing the different institutes significantly increase the explained variance, indicating that apart from the aforementioned factors on the teacher level, the teacher education institute influences the uptake of ICT for teaching practice significantly. The final model explains 58.1 % of variance in the dependent variable. The factor contributing the most to the explained variance in the final model remains ICT skills and computer confidence, with a standardized beta coefficient of 0.52 and 0.158 respectively.

		Model 1	Model 2	Model 3	Model 4
Non-manipulative factors	Gender (female)	-.187***	n.s.	n.s.	n.s.
	Age	-.311***	n.s.	n.s.	n.s.
	Natural science	.141**	n.s.	n.s.	n.s.
	Social sciences	n.s.	n.s.	n.s.	n.s.

	English	n.s.	n.s.	n.s.	n.s.
	Vietnamese language	n.s.	n.s.	n.s.	n.s.
	Educational sciences	n.s.	n.s.	n.s.	n.s.
	ICT/technology	.233 ^{***}	n.s.	n.s.	n.s.
	Mathematics	.098 [*]	n.s.	n.s.	n.s.
Manipulative, external factors	Internet access at home and in TEI	-	n.s.	n.s.	n.s.
	Internet access at home only	-	n.s.	n.s.	n.s.
	Internet access TEI only	-	n.s.	n.s.	n.s.
	Personal access computer at home	-	n.s.	n.s.	n.s.
	Personal access computer TEI	-	-.084 [*]	-.086 [*]	-.099 ^{**}
	Computer use general	-	-.129 [*]	-.125 [*]	n.s.
	Computer use for work	-	.173 ^{**}	.172 ^{**}	.138 [*]
	Intensity internet use	-	n.s.	n.s.	n.s.
	ICT skills	-	.499 ^{***}	.503 ^{***}	.522 ^{***}
	Computer confidence	-	.164 ^{**}	.160 ^{**}	.158 ^{***}
Manipulative, internal factors	Attitude towards computers	-	-	n.s.	n.s.
	Student learning as construction	-	-	n.s.	n.s.
Contextual factors	Province 1	-	-	-	n.s.
	Province 2	-	-	-	-.185 ^{***}
	Province 3	-	-	-	n.s.
	Province 4	-	-	-	n.s.
Adjusted R ² 'Use of ICT in teaching practice'		.161	.555	.553	.581
F change		10.579	39.880	.316	8.115
df1		9	10	2	4
sig. F change		.000	.000	.730	.000

Note. – not included in model, n.s. not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4: Factors Influencing the Use of ICT for Teaching Practice: Standardized Regression Coefficients, Proportion of Explained Variance and F Change

Conclusions and Discussion

For most teacher educators in the 5 teacher education institutions in the Northern and the Central Vietnam, access is not a barrier to the use of ICT for teaching practice. Personal access to a computer in the teacher education institute results in a lower use of ICT for teaching practice though ($\beta = -.099$). It can be assumed that this personal access is for other purposes than use in classroom practice. As described in other research it could be that many teachers own and use computers for their own administrative work, but never use them in their classrooms (Watson, 2001). Capability theory (Alampay, 2006) instructs that deployment of ICT should always be informing about its added value or the opportunities it creates.

It is mainly ICT skills of teacher educators ($\beta = .522$) and computer confidence ($\beta = .158$) which influences whether or not ICT applications are used for teaching practice. Better skilled teacher educators tend to use more diverse ICT applications and on a more regular basis than teacher educators who perceive lower ICT skills. As described by Jones (2004) lack of competence goes together with lack of confidence and both factors are very significant determinants for the uptake of ICT in teaching practice. There is a significant correlation (with $p < 0.01$) of 0.576 between ICT skills and computer confidence.

Gender, age and subject teaching influence the integration of ICT in teaching practice. The younger teacher educators can be seen as ICT natives (Prensky, 2001) who have been more exposed to ICT. The same applies for teacher educators teaching subjects like technology and ICT, mathematics or natural sciences. This confirms the

importance of subject cultures (John, 2005) for the integration of ICT in education. There is no significant influence of gender, age or subject teaching on the integration of ICT in teaching practice, over the variance explained by ICT skills and computer confidence though.

There are high expectations concerning the added value of ICT, but these values have no influence on the use of ICT for teaching practice ($p > .05$). Conceptions of teacher educators of student learning play no role in their use of ICT for teaching practice ($p > .05$), indicating a gap between rhetoric and practice as described by Judson (2006). Richards (2004) points out that abstract ideas about learner-centered pedagogy, life-long education and flexible learning are well known and even perhaps the theoretical orthodoxy today in many Asian countries. But Richards also observes that "... despite the attraction and obvious relevance of 'new learning' theories and policy, it is not easy in practice to give up or change the traditional habits of hierarchical organization and transmission model of the authoritative teacher-passive student relations" (p. 342).

Vietnamese teacher educators mostly use ICT in teaching practice in a way it mainly replaces traditional practice. Teacher educators sometimes or regularly use word processing software for production of documents (73.7%), presentation software is used for lecturing or they use ICT to access information. When it comes to more advanced, subject specific applications or electronic communication, which could activate students in the learning process, use of ICT remains low. Similar results are found in research on the use of ICT by teacher mentors. Cuckle and Clarke (2002) found that their respondents used a range of ICT applications for lesson preparation, but that these applications were much less used in classroom teaching. Gülbahar (2007) describes teachers who feel competent in using ICT available in the school, but no successful integration in the classroom is taking place. Mills and Tincher (2003) describe pervasive use of computers by teachers in preparation for instruction, but limited use of computers by teachers for delivering instruction and integrating technology in the classroom. There are strong and significant correlations between the use of different ICT applications for teaching practice (from .226 to .650). This indicates that there are some Vietnamese teacher educators who are ICT minded, enthusiasts or innovators, in the sense described by Kirkup & Kirkwood (2005). These educators apply their skills in their teaching practice, while there are teacher educators who don't use ICT in any way for teaching practice. Teachers who could not be considered 'innovators' or 'early adopters' are unlikely to be adventurous in their use of ICT; instead they will use the technology to replicate or supplement existing teaching practices. Such uses do not require teachers to rethink their teaching practices or reconsider their understanding of student learning (Laurillard in Kirkup & Kirkwood, 2005). There are differences between respondents from different teacher education institutes and probably context variables like ICT policies, budget and educational management play a role in the integration process of ICT. Methodologically multilevel models have to be developed to explore how these factors of the school level contribute to integration of ICT in education (Wong & Li, 2008).

As described by Selwyn (2007) for the West, also no educational revolution is taking place yet in Vietnam. Vietnam is at the beginning of integrating ICT in education and lessons can be learnt from research in the West. Integration of ICT in education is a slow process and observations bring to light a certain path or steps which are taken in the process. Researchers emphasize the notion of change as a staged process (Tearle, 2003). In the first place often investments are made in technology and skills training and ICT is seen as an object of education. ICT as object of education refers to learning *about* ICT and the acquisition of ICT skills: teachers and learners have to know how to work with the medium, the technology and therefore have to acquire the necessary skills to become ICT literate. When having a closer look at lack of teacher confidence though, research shows that this may be caused by lack of 'self training', lack of skills training as well as lack of pedagogical training. Even though an element of ICT skills training is necessary (Preston et al. in Jones, 2004), courses which lack pedagogical aspects are likely to be unsuccessful (Veen in Jones, 2004).

The present study does not offer the answer to successful integration of ICT in education. It is clear that important conditions for successful integration are met in Vietnam. At this stage, access is no longer the main factor, even though personal access and access to teaching technology could still make a difference. Further research on the importance of availability of equipment for teaching practice is necessary. Skills training is still important. Vietnam could make a difference though and aim to go beyond a limited, skills-based approach, striving for integration of ICT in education as a tool for *active* teaching and learning. It is clear that Vietnamese teacher educators are very much aware of the potentials of ICT and they are open for constructivist approaches of teaching and learning. At the same time as improving access and training skills, Vietnamese teachers and teacher educators should be prepared for a changed teacher role and should know *how* ICT can be used in a way it improves the learning process towards active teaching and learning.

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